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Conference Abstract

Combined High-Throughput Imaging and Sequencing: Addressing the collections on demand requirement in SYNTHESYS+ project

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Abstract

Imagine you are a scientist, working on collections. You have your pet taxon and you need information which is distributed in a number of books and publications but also in the specimens deposited in Museums or Herbaria. Instead of paying visits to these establishments, around the world, you wish there was a means to transform all the information you need into a digitized form of the physical objects, you can reach from the screen of your laptop, tablet or cell phone. You dream you were able to watch, inspect and even dissect the type material you need online but also to compare it with others they way sequences are blasted against large databases, these days. You plan to make global research on this taxon and try to derive patterns from both the molecular and organismal

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level of the biological organization and to link the patterns resulting to the drivers of change for this taxon. This is the vision of the Virtual Museum of Natural History and one of the ways to achieve this vision is to address the “collections on demand” requirement.

One of the possible means to address this requirement is the digitization through the use of the micro-ct technology. The micro-CT virtual laboratory (vLab), developed by LifeWatchGreece research infrastructure (RI), makes it possible the online exploration and dissemination of micro-CT datasets, which are only rarely made available to the public due to their large size and a lack of dedicated online platforms for the interactive manipulation of 3D data.

This presentation shows the development of such a “collections on demand” function, implemented by the SYNTHESYS+ project (DiSSCo RI), which combines such high-throughput technologies, that is micro-ct and genomics, to address the scientific community’s requirements. We show that this approach to combine patterns deriving from the application of novel techniques, which represent different kinds of observations is possible and we propose certain case studies as examples. The innovation aspects of this function include:

- Expansion and development of cost models for Collections on Demand;
- Development of standards and guidelines for exchange of collection-derived imaging data;
- Construction of new data pipelines and standard workflows, enabling access to complex digital content such as 3D scans;
- Development of novel molecular lab protocols, workflows and informatics pipelines, to enable large scale;
- DNA sequencing of NH collections.

Keywords

virtual research environments (VREs), virtual laboratories (vLabs), Research Infrastructures, DiSCCo, LifeWatch ERIC, SYNTHESYS+, high-throughput sequencing, high-throughput imaging

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